Food and Agriculture Organization of the United Nations

The potential benefits of precision seeding technologies and how to enhance adoption by smallholder farmers

by

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Massive Opportunities for African Farmers

- Africa's population is urbanizing – food market of 250 M by 2030
- Africa's annual food import bill $35 billion; $110 billion by 2025
- Africa has 60% of the global total uncultivated crop land
- Africa is the youngest continent, 60% under 35 years old. 420 million youth aged 15-35; to double by 2040. 72% have access to Digital Tools (CTA).

There are challenges to be overcome!

1. Threatening **climate change** challenges
2. Farming related **land resource degradation and loss of biodiversity** – acidification, erosion, pollinators.
3. Declining rural labour force, **ageing farming population** and increasing **feminization** of agriculture
4. **Subsistence farmers** – delinked from new farming technologies, inputs, and markets

Why Promote Conservation Agriculture (CA) with Sustainable Agricultural Mechanization (SAM)

1. The CA principles on minimum soil disturbance and permanent soil cover require specialized equipment (mechanization) for soil cover management and seeding
2. 65% of the area under cultivation in Africa is by human muscle. This is unproductive and unattractive to the youths and the majority of the farmers who are women.
3. Without mechanization organic amendments to sustainable agriculture (e.g. rock phosphates, manure, cover crops) are too labour intensive and difficult to achieve.
4. African Union has declared to retire the hand hoe to the museum by 2025 & have 25 M ha under CA by 2025!
5. We need to innovate on suitable models to attract the youth and engender agriculture.
6. Need to innovate and attract more private sector investments in Farming & Agribusiness

The magic is not in CA alone or the mechanization: but the **Mechanization** with **CA**

What equipment for direct seeding?

Hand jab planter

Oxen direct seeding

2WT Direct Seeder

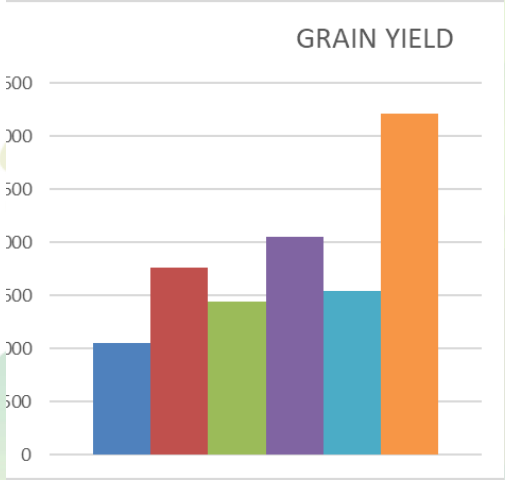
4WT Direct Seedier

Hand hoe planting basins

Large-scale no-till seedier

Challenges of precision seeding to smallholders

- Constrained physical and financial access to seeders
- Unproductive and unprofitable tillage-based farming enterprises
- Obsolete business models of buy-to-own and use
- Shortage of appropriately tailored seeders – to farm sizes, power sources, etc.



Potential benefits of direct seeding

1. **Timeliness of planting** for the crop to benefit from the maximum heat units of the sun to achieve its optimal yield potential.
2. **Reduction by 25%-60% of menial and high drudgery work** of hand hoe digging of planting basins/holes
3. Attainment of **recommended plant populations, saves seeds**, provides the conditions for yield optimization. Mechanized CA famers save 15%-50% of seeding rates, and up to 50% of fertilizer rates.
4. Precision metering and placement at the desired depth and spacing of seeds and fertilizers, **to achieving the 4R nutrient support systems** to achieve increased production, profitability, and enhanced environmental protection.

Benefits of mechanized direct seeding with CA

1. **Reduce or even eliminate the need for land preparation and heavy digging** with the hand hoe or plough. Labour requirements are reduced by 50%.
2. **For every one-degree increase in organic material in our soil, the water-holding capacity increases by 190,000 litres per hectare!** (NRDC, 2015).
3. **Bring new land under orderly production** as opposed to old slash-and-burn or shifting cultivation systems.

Double yields in marginal semi-arids

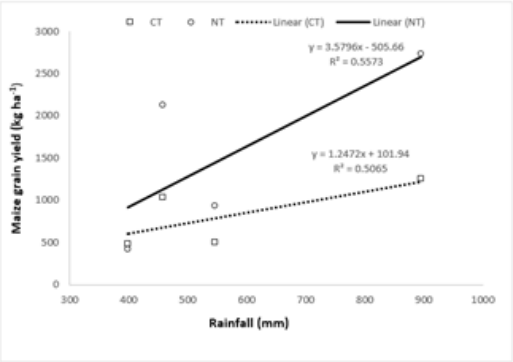


Figure 15.6. Enhanced water use efficiency under CA illustrated by relationship between rainfall and maize yields. CT = Conventional Tillage, NT= No Till (Conservation Agriculture)

"300 mm is sufficient to produce a crop. The inadequate rainfall assumption is incorrect"

Agventure: https://www.agvke.com/conservation-agriculture

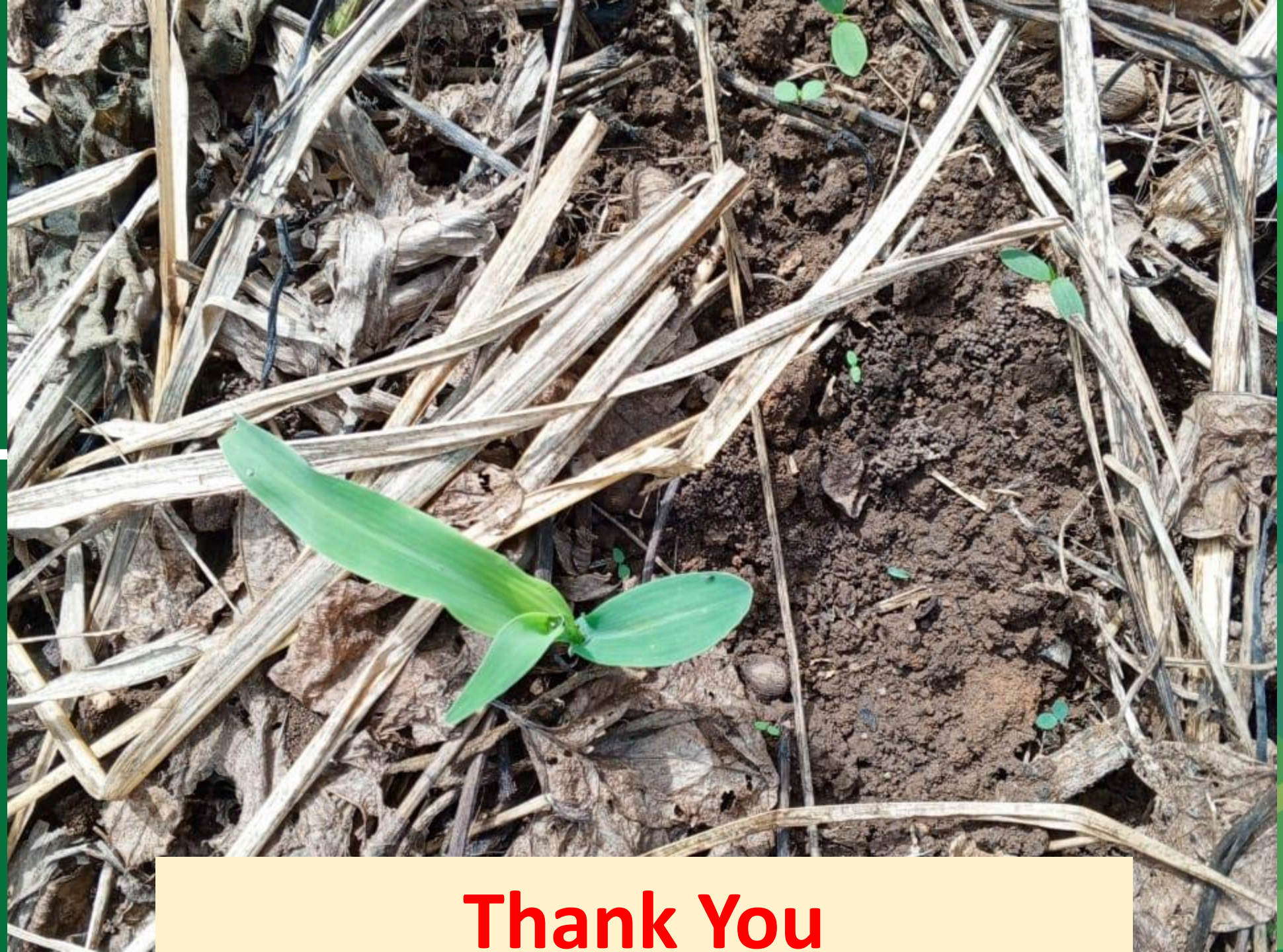
The magic is not in CA alone or the mechanization: but the **Mechanization** with **CA**

+ Benefits of mechanized direct seeding with CA

4. **Reduce use of agrochemicals:** access to farm power enable efficient management of organic soil enriching amendments – e.g. nitrogen fixing leguminous cover crops, manure transportation (10 tons/ha = 42 km x 20 kg), and consequently use of agrochemicals for greener environment. Case of the Marejea (Crotalaria Orchroleuca) project in Ruvuma Region.
5. **Reduced drudgery, modernized/mechanized farming is attractive to youth, to farming & rural life.**
6. **Mechanized CA enhances productivity, & resilience** to farming, thus is poised to attract investors and investments (also from local investors) to farming

Ability to manage soil cover crops (legumes)

The magic is not in CA alone or the mechanization: but the **Mechanization** with **CA**



Thank You